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The prevalence and clinical interpretation of pyuria in end-stage renal disease patients

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Objectives : Pyuria is a helpful marker for urinary tract infection (UTI) in general population. Meanwhile, pyuria is not infrequent in advanced chronic kidney disease (CKD) patients even without UTI in clinical practice. There has been assumption that sterile pyuria can be seen in CKD due to chronic renal parenchymal inflammation, but data are virtually nil, and the reference value of white blood cell (WBC) count in CKD patients is not known. We investigated the prevalence and characteristics of pyruia in end-stage renal disease (ESRD) patients by differential counting of WBC in urine.

Methods : Routine urine analysis with microscopy (UA) was performed in stable hemodialysis (HD) patients. Pyuria was defined as WBC ≥ 5-10/HPF by urine microscopy. Urine culture and WBC differential counting was done in case UA shows pyuria. Culture-positive pyuria was defined as UTI.

Results : UA was examined in 68 HD patients who voids at least once every day (mean age 60.5±13.8, male 36 patients and female 32 patients). The percentage of pyuria was much higher in HD patients (n=34, 50%, 36.1% in male and 65.6% in female) compared to that of the general population with eGFR ≥ 60ml/min/1.73m2 (7.1%, 1.3% in male and 18.6% in female) which was obtained from health medical examination in the same hospital. Co-morbid diabetes was more common (39% vs 61%, p=0.046) and hs-CRP was higher (0.17±0.20 vs 0.37±0.46, p=0.031) in pyuia group. Of the 34 HD patients with pyuria, only 6 cases (17.6%) were proven to be UTI. The degree of WBC number was significantly higher in UTI (WBC ≥ 60/HPF was 66.7% in UTI and 14.2% in sterile pyuria). In WBC differential counting, contrary to our expectations that lymphocytes would comprise the most of WBCs, the majority of WBC was still neutrophils (70%) in sterile pyuria. However, the percentage of lymphocytes was greater in sterile pyuria compared to UTI (17.4% vs 1.2%, p=0.007).

Conclusions : Sterile pyuria is common in ESRD including male patients. Although the majority of WBC was still neutrophils in sterile pyuria after WBC differential counting, the percentage of lymphocytes was much greater

compared with that of UTI in ESRD patients. The clinicians should be careful before they suspect UTI in ESRD patients with pyuria. It might give more information regarding the pathophysiology of CKD if we examine the pattern of pyuria in more diverse CKD population.

Keywords : CKD, dialysis, pyuria, inflammation